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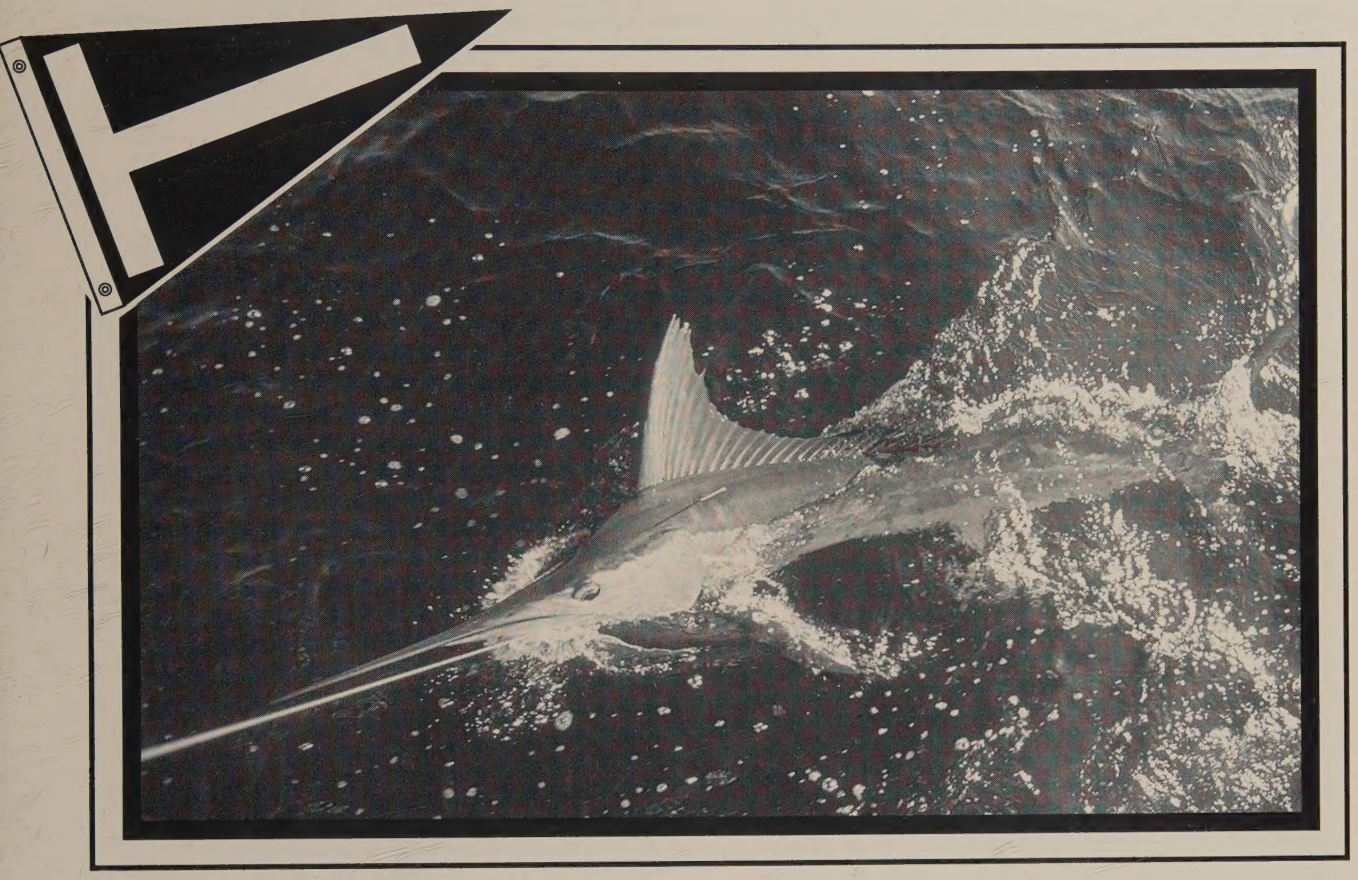
The Southwest Fisheries Science Center's

2002 Billfish Newsletter



- 2001 Billfish Tagging and Recoveries
- Combined Data from Five Major Billfish Tagging Programs Analyzed
- Trends in 2001 Billfish Angler Catch Rates
- Tracking Southern California Striped Marlin
- Top Anglers and Captains Acknowledged
- Update: Draft Fishery Management Plan for U.S. West Coast Highly Migratory Species

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NOAA
U.S. DEPARTMENT OF COMMERCE

INTRODUCTION

The Southwest Fisheries Science Center's (SWFSC) billfish research program provides information for the conservation and management of billfish resources in the Pacific. This Billfish Newsletter is published annually and describes the primary components of the SWFSC's billfish research. Many of our investigations rely on cooperation from billfish anglers, sport fishing clubs, commercial fishers and agencies affiliated with the SWFSC. We are grateful for their coooperation and support for billfish conservation and acknowledge those individuals and clubs that support our mutual efforts in this newsletter.

The Billfish Angler Survey, provides angler catch and fishing effort information at major fishing centers throughout the Pacific. Our angler-based Billfish Tagging Program provides data on the biology, distribution and migration patterns of Pacific billfish. In August 2001, the Third International Billfish Symposium was held in Cairns, Australia. One report delivered there presented the combined results of the five major constituent-based billfish tagging programs, including the SWFSC's billfish tagging program. Combined data represented the first worldwide results of 48 years of billfish tag and release statistics and is summarized on page 10. Also in this Newsletter, are the results of three marlin tagged with satellite archival transmitters during the San Diego Marlin Club's Offshore Invitational marlin tournament.

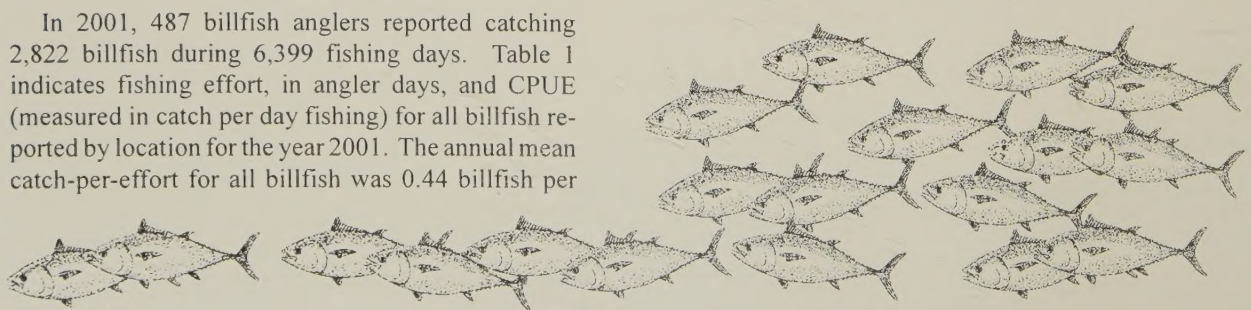
THE INTERNATIONAL BILLFISH SURVEY

The International Billfish Angler Survey began in 1969 and now provides a 33-year time series of recreational catch and fishing effort for billfish in many key Pacific locations. Catch per unit of effort (CPUE) is measured in catch of billfish per angler fishing day. This measure of angler success can indicate changes in stock size or environmental conditions, or local depletion by a fishery and CPUE is an important component of stock assessment models used in determining fishery allocations.

In 2001, 487 billfish anglers reported catching 2,822 billfish during 6,399 fishing days. Table 1 indicates fishing effort, in angler days, and CPUE (measured in catch per day fishing) for all billfish reported by location for the year 2001. The annual mean catch-per-effort for all billfish was 0.44 billfish per

Table 1. Results of all billfish reported for the 2001 Billfish Angler Survey. Numbers indicate total days fished by location and catch-per-fishing day. Data in parentheses are values recorded in 2000. Major species in each location are indicated; striped marlin (SM), blue marlin (BLM), black marlin (BKM), and sailfish (SF).

LOCATION	ANGLER FISHING DAYS	BILLFISH PER FISHING DAY (CPUE)	MAJOR SPECIES
PACIFIC OCEAN			
Hawaii, U.S.A.	3,126 (3,408)	0.40 (0.29)	BLM
Southern California, U.S.A.	1,405 (1,365)	0.11 (0.07)	SM
Baja California, Mexico	1,150 (1,335)	0.63 (0.92)	SM
Guaymas, Mexico	72 (13)	0.17 (0.15)	SF
Mazatlan, Mexico	11 (31)	0.36 (1.00)	SF
Manzanillo, Mexico	18 (30)	0.83 (0.90)	SM
Puerto Vallarta, Mex.	181	0.03	SF
Acapulco, Ixtapa, Zihuatanejo, Mexico	89 (125)	1.49 (1.83)	SF
Guatemala	27 (123)	4.81 (10.27)	SF
Costa Rica	65 (71)	2.68 (2.31)	SF
Panama	46 (64)	2.26 (1.52)	SF
Japan	23 (89)	0.52 (0.22)	BLM
Tahiti	9	0.56	BLM
Guam, U.S.A.	10 (0.5)	0.30 (0.60)	BLM
Marshall Islands	10	0.20	BLM
Midway Island	2 (16)	1.00 (0.12)	BLM
Kiribati	6 (62)	0.33 (0.45)	SF
Fiji	5 (4)	0.20 (0)	SF
Australia	21 (125)	0.67 (0.34)	BKM
New Zealand	0 (83)	0.00 (0.11)	SM
INDIAN OCEAN			
Kenya	0 (7)	0.00 (0.86)	SF
Maldive Islands	0 (162)	0.00 (0.86)	SF
Mauritius	0 (30)	0.00 (0.60)	BLM
ATLANTIC OCEAN			
Atlantic total	148 (164)	0.37 (0.32)	SF



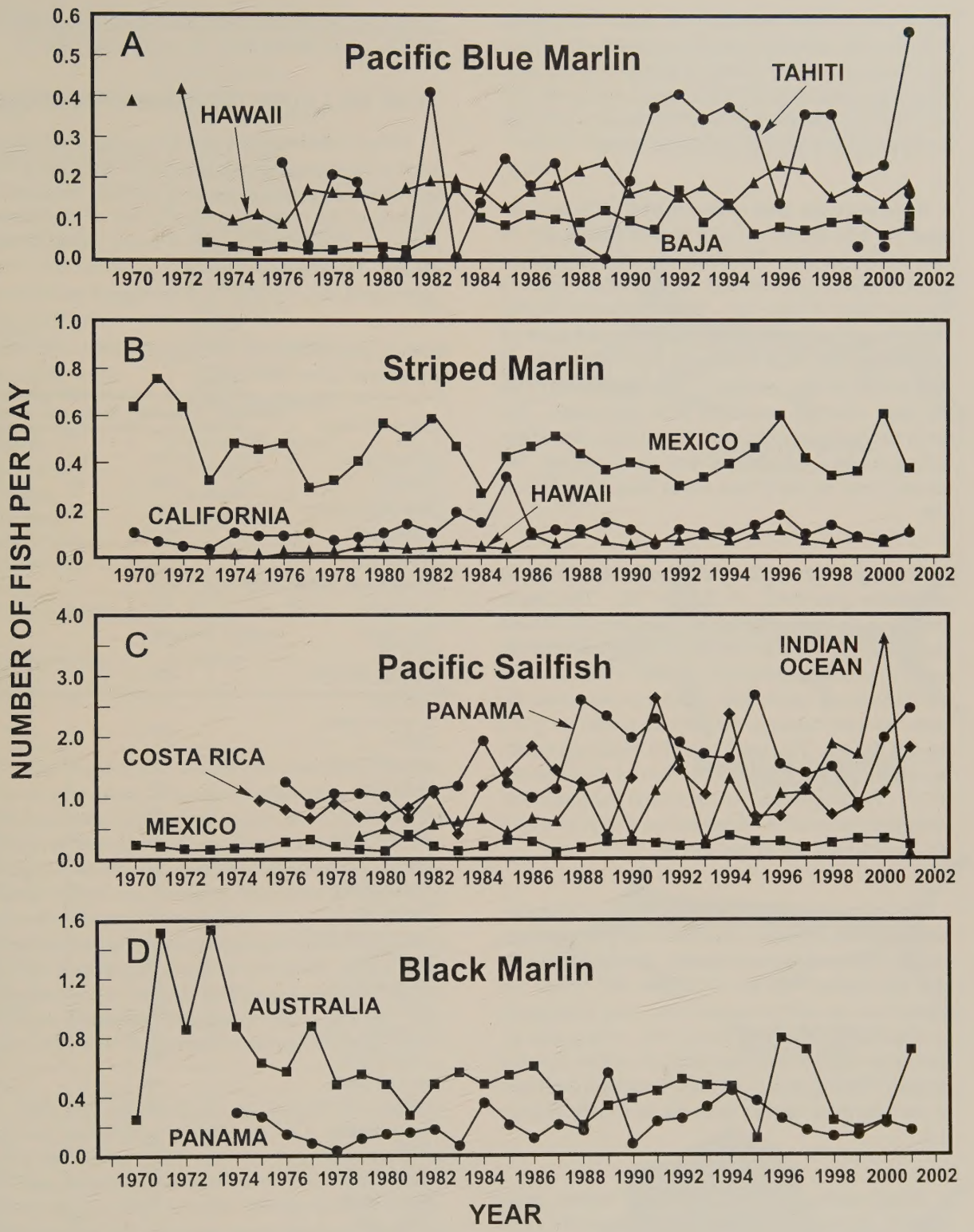


Figure 1. Catch per unit of effort (CPUE) in number of fish per angler day reported by region from 1969 to 2001, for Pacific blue marlin (A), striped marlin (B), Pacific sailfish (C), and black marlin (D).

day in 2001, down from 0.61 in 2000. The current overall mean catch rate of 0.44 is below the prior five-year average of 0.50 (1996 to 2000). The all-time mean high catch rate of 0.57 occurred during the first years of this survey (1969 to 1971). The lowest catch rates averaged 0.33 during the mid-1970s.

Reported catch rates of blue marlin off Hawaii totaled 591 blue marlin in 3,126 days of fishing or 0.19 blue marlin-per-day. The catch rate was a little better than the prior three years but fairly constant within a 20-year range (Figure 1a). Blue marlin are tropical and sub-tropical in habitat and rarely extend north of Magdalena Bay, Baja California Sur. The catch off Baja totaled 96 blue marlin in 1,150 days fishing (0.08 per day), which is consistent with prior years. The catch rate in Tahiti (0.56) was higher than normal but influenced by a few days of very good catches. No catches were reported from Costa Rica, Mauritius or Fiji.

Trends in mean angler catch rates for striped marlin are shown graphically in (Figure 1b). The angler catch rate reported off Southern California (0.10) and Hawaii (0.10) improved slightly in 2001 but has remained fairly consistent since the mid-1980s. Around the southern tip of the Baja California peninsula anglers reported catching 490 striped marlin in 1,225 days of fishing. This catch rate of 0.40 striped marlin per angler day was slightly more than for all of Mexico (0.37). The area around the tip of Baja California Sur, Guaymas and south to Mazatlan has always provided good catch rates for striped marlin.

Striped marlin are less abundant south of Mazatlan where sailfish are more abundant from Manzanillo to Ixtapa, Zihuatanejo and Acapulco. Catch rates of sailfish throughout Mexico (0.20) did not reflect the greater success off the central coast from Manzanillo to Zihuatanejo and Acapulco (1.49). Guatemala reported the highest catch rate with 130 sailfish reported in just 27 fishing days (4.81) and Costa Rica continues to see improved catches from the mid 1990s (Figure 1c).

Black marlin, common in tropical waters, occasionally frequent temperate areas. Reported catch rates of black marlin in Australia (0.67) improved over prior years although the catch rate off Panama (0.17) remained below levels seen in the early 1990s (Figure 1d). Black marlin are often reported around the tip of Baja California and rarely occur off Southern California. Shortbilled spearfish continued a strong run off Hawaii where anglers reported catching 340 in 3,126 fishing days for a catch rate of 0.11.

THE BILLFISH TAGGING PROGRAM

Release and recapture data from tagged billfish are used to determine migration patterns, geographic distribution and growth patterns of billfish. Since its inception in 1963 more than 49,063 fish of 76 different species have been tagged and released (Table 2). The Billfish Tagging Report cards received for 2001 indicate a total of 1,519 billfish were tagged and released

Table 2. Summary of all fish tagged in 2001 with releases and recoveries for 1963-2001.

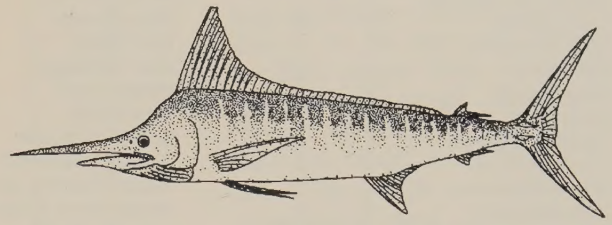
Species Name	Releases 2001	Releases Total	Recoveries Total	Rates %
Striped Marlin	430	20,831	326	1.56
Sailfish	169	7,803	46	0.59
Blue Marlin, Pacific	646	5,915	63	1.07
Billfish, unid.	10	4,302	5	0.12
Black Marlin	6	3,345	69	2.06
Shortfin Mako Shark	182	1,336	31	2.32
Roosterfish		920	29	3.15
Short-billed Spearfish	256	1,214	1	0.08
Broadbill Swordfish	2	506	15	2.96
Yellowtail		492	36	7.32
Dolphinfish (Mahi Mahi)		407	3	0.74
Yellowfin Tuna	1	345	26	7.54
Blue Shark	11	327	5	1.53
Skipjack Tuna		97	2	2.06
Thresher Shark	6	133	14	10.53
Bat Ray		84	0	0.00
Albacore Tuna	2	87	0	0.00
Bigeye Tuna		79	2	2.53
Hammerhead Shark		52	2	3.85
Bluefin Tuna		50	5	10.00
White Sturgeon		50	1	2.00
Black Sea Bass		40	8	20.00
Blue Marlin, Atlantic		42	0	0.00
Leopard Shark		39	1	2.56
Whitetip Shark	1	40	1	2.50
Wahoo		38	3	7.89
Bronze Whaler Shark		50	1	2.00
Jack Crevalle		32	0	0.00
Blue Crevalle		30	1	3.33
Shark, unid.		26	0	0.00
Barracuda		25	2	8.00
Tiger Shark		17	2	11.76
White Marlin		13	1	7.69
Whale Shark		4	1	25.00
All Others	13	292	10	3.42
TOTALS	1,735	49,063	712	1.45

Table 3. Summary of billfish tagged in 2001.

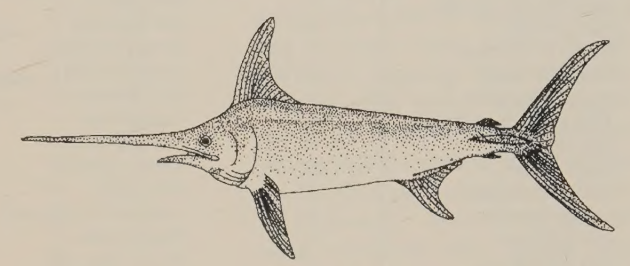
AREA	SPECIES	TOTAL
PACIFIC OCEAN		
Southern California, U.S.A.	Striped Marlin Marlin unidentified	37 5
Eastern Pacific Ocean	Broadbill Swordfish Striped Mariln Pacific Blue Marlin	2 1 1
Hawaii, U.S.A.	Pacific Blue Marlin Striped Marlin Short-Billed Spearfish Sailfish Marlin unidentified Black Marlin	632 292 256 5 5 1
Baja California, Mexico	Striped Marlin Sailfish Pacific Blue Marlin	98 7 7
Mazatlan, Puerto Vallarta, Mexico	Striped Marlin Sailfish Pacific Blue Marlin	2 1 1
Manzanillo, Acapulco, Mexico	Sailfish Pacific Blue Marlin	125 1
Costa Rica	Sailfish	27
Panama	Sailfish	2
Australia	Black Marlin	5
Tahiti, French Polynesia	Pacific Blue Marlin	2
Fiji	Pacific Blue Marlin	1
Marshall Islands	Pacific Blue Marlin	1
INDIAN OCEAN		
Maldive Islands	Sailfish	2
TOTAL		1,519

by 1,045 anglers and 197 fishing captains (Table 3). This is more than twice the number tagged in 2000. Thirty-senven (37) striped marlin and 5 unidentified marlin were tagged off southern California. In Hawaii, 632 blue marlin and 292 striped marlin were reported tagged and released. This was another good year for tagging short-billed spearfish in Hawaii where 256 were tagged. Tagging off Mexico remained similar to past years with 112 billfish tagged from Magdalena Bay south to La Paz and 130 more tagged between Mazatlan, Zihuatanejo and Acapulco. Two swordfish were tagged off Mexico in the year 2001.

Each year we recognize the anglers and captains who tag and release billfish. In 2001, individual anglers numbering 1,045 reported tagging at least one billfish. Individual recognition of each angler who reported tagging two or more billfish in 2001 is presented in Table 4. Limited space prevents listing all 1,045 taggers. Rex Crosland and Robert Anthony each tagged over ten marlin in Hawaii. Dave Denholm and Howard Bond reported tagging the most marlin off Mexico. We also list the captains of charter and private boats who tagged significant numbers of billfish in specific regions (Table 5). We acknowledge John Bagwell and Randy Parker tagging over 50 marlin in Hawaii. Continued interest and cooperation by these captains have greatly enhanced the Billfish Tagging Program, and their efforts are truly appreciated.

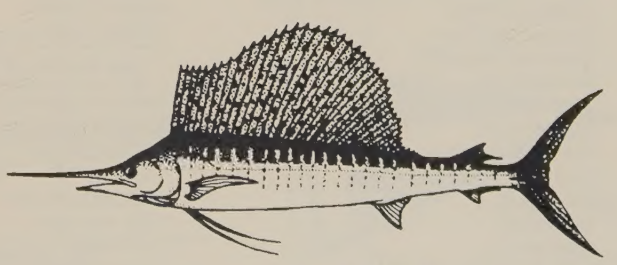


Striped Marlin
Tetrapterus audax



Broadbill Swordfish
Xiphias gladius

Black Marlin
Makaira indica



Sailfish
Istiophorus platypterus

Table 4. Names of anglers tagging substantial numbers of billfish, and the number of billfish tagged and released. From *Billfish Tagging Report* cards received for 2001 calendar year.

ANGLER NAME	BILLFISH TAGGED
HAWAII, U.S.A.	
Rex Crosland	13
Robert Anthony	11
Chris Whittingham	8
Catherine Hillenbrand	7
Ryan Fiedorowicz	7
William N. Jardine	7
Larry Smith	6
Sue Vermillion	6
Bill Borkan	5
Bob Struwe	5
Don Hilton	5
George Handgis	5
Janet Baldwin	5
Kaimi Nelson	5
Ken Borkan	5
Michael Tokunaga	5
Steve Morse	5
Alton E. Sullivan	4
Carol Fuller	4
Claire Parker	4
Kenneth R. Corday	4
Mike House	4
Ralph R. Conner	4
Russell Allen	4
Sergei Devatkin	4
Timothy Edwin Hanlon	4
Wayne Wong	4
Allen Stuart	3
Bob Christenson	3
Henry Wright	3
Jeff Stafford	3
Joe Humphrey	3
Kenny Bauchman	3
Larry Bernard	3
Lindsey Engelhard	3
Mac Meadows	3
Mary Martin	3
Michael Bozzuto	3
Michael Dewitt	3
Michael Voisin	3
Mike Jacobsen	3
Mike Perry	3
Rick Oliva	3
Rob Thompson	3
Steve Keinath	3
T. Neal McNamara	3
Al Gaskill	2
Al Sullivan	2
Alan Tyler	2
Andrew Winters	2
Angelo Arpini Coutinho	2
Angelo J. Rossi	2
Audrey Crimmins	2
Beatrice Holzerland	2
Bill Gutierrez	2
Billy Burnett	2
Bob McGuire	2
Bonnie Lee Kehop	2
Boyd De Coito	2
Brian Scott	2
Dwiji Aliven	2
Carl Tantillo	2
Chip Bahouth	2
Chris Birdwell	2

ANGLER NAME	BILLFISH TAGGED
HAWAII, U.S.A.	
Chip Choy	2
Dan Hibbeln	2
Daron Castoro	2
David O. Blair	2
David Steen	2
David Zerfoss	2
Ellen Forrest	2
Eric Odeen	2
Guy Terwilliger	2
Harold Cook	2
Henry Potts	2
Ivette Rodriguez	2
James J. Williams	2
James Karamouzis	2
James Perry Erwin III	2
Janet B. Martic	2
Jason Criss	2
Jason Ridge	2
Jeff Smith	2
Jeremy Hall	2
Jim Jarvis	2
Jim Ramsey	2
Jimmy Akana	2
Jose Carrera	2
Kari Sanford	2
Keith Shay	2
Kenji Shirata	2
Kevin Schaller	2
Kim Yeck	2
Leanne M. McCorry	2
Mac Fraser	2
Mark Takahata	2
Mary Raysa	2
Mike Cordero	2
Mike Hudnall	2
Patty Glenn	2
Paul Mueller	2
Phil Trowbridge	2
Ralph D. Nunez	2
Rebecca Woodburn	2
Rob Kildow	2
Roger Bourget	2
Roger J. Jore Jr.	2
Ron Shiraishi	2
Ross Smiley	2
Steve Stone	2
Takaaki Ushimura	2
Thomas Madigan	2
Todd Struyk	2
Walter Hester	2
Wayne Prosser	2
Werner Pollard	2
Whitney Lynn	2
BAJA CALIFORNIA, MEXICO	
David W. Denholm	19
Steve Brackmann	11
Don Anderson	10
Toby Dial	7
Mark Brackmann	6
Rich Johnson	6
Dan Taylor	5
Frank Caster	5
Doug Bull	4

ANGLER NAME	BILLFISH TAGGED
BAJA CALIFORNIA, MEXICO	
Gerald Lester	3
Barbara Peabody	2
Cooke Bausman III	2
Douglas A. Daniels	2
John Algeo	2
Phil Johnson	2
Richard Ruffini	2
Ronald W. Bradley	2
Tim Owen	2
Tony Pfoole	2
MANZANILLO-ACAPULCO, MEX.	
Howard Bond	21
Richard Spielman	13
Orie Williams	12
Bud Keeney	9
Ken Ellis	8
Jim Mead	6
Roland Ramirez	6
Tom Grant	5
Mark Guagliardo	4
Cecelia Blawie	3
Dan Blattler	3
Matt Palmer	3
Jim Helgemo	2
John Porta	2
Sirenio Guzman	2
SOUTHERN CALIFORNIA, U.S.A.	
Lynn Jasper	6
Mike Petersen	2
David W. Denholm	2
Dave Maze	2
Jim Francis	2
Steve Behrens	2
COSTA RICA, CENTRAL AMERICA	
Greg Kelly	11
Avery Bean	4
Max Kelly	3
Bob Walker	2
Steve Goodfellow	2
AUSTRALIA	
Fernando Aguilar	2
Thomas Irizarry	2

Table 5. Names of captains tagging substantial numbers of billfish, and the number of billfish tagged and released. From *Billfish Tagging Report* cards received for 2001 calendar year.

ANGLER NAME	BILLFISH TAGGED
HAWAII, U.S.A.	
John Bagwell	73
Randy Parker	58
Scott M. Fuller	48
F. McGrew Rice	47
Tim E. Hicks	43
Peter Hoogs	42
Bill Crawford	41
Scott Jones	39
Alan Abdill	36
Dennis R. Cintas	34
Guy Terwilliger	31
John Jordan	29
Mark Shultz	29
Robert McGuckin	29
Jerry Allen	29
John J. Burke	28
Bill Casey	26
Marlin Parker	24
Jeff Fay	23
Neal Isaacs	23
William Dorr	19
Bill Duncan	19
William Shane Sinclair	18
James Dean	17
Tom Casey	16
Doug Armfield	15
Steven D. Kaiser	15
Marty L. Sands	14
Tony Clark	13
Kim Miyaki	12
Lance Gelman	11
Jeff Kahl	11
Frank Boyd	11
Gus Sellers	11
Fran O'Brien	8
Doug Pattengill	8
Mike Derego	8
Charles E. Haupert	8
William Lewis Dorr	7
James C. Dean	7
Kevin M. Hogan	6
Doug Barna	6
Kevin McLaughlin	6
Reuben Rubio	6
Brian (Chip) Van Mols	6
Shane Sinclair	6
Kent Mongreig	5
Mike Holtz	5
Randy Llanes	5
Bill Enger	5
Steve Cravens	5
Rich Newcomb	5
Roy Sokolowski	4
Allen Ayano	4
Bill Benbow	4
Terry Dahl	4
John Llanes	4
Ryan Fiedorowicz	4
Dennis D. Smith	4
Robert C. Sylva Jr.	4
Rennie Boyd	4
Neal Preston	4
Ryan Foster	4
Jim Patterson	3
Jimmy Akana	3

ANGLER NAME	BILLFISH TAGGED
HAWAII, U.S.A.	
Geoffrey R. Walker	3
Frank Rennie Boyd	3
Chuck Frumin	3
Rick Moss	3
C. Bruce Evans	3
Scott Crampton	3
Terry Kellam	3
Timo Mageau	3
James G. Ward	2
Chip Van Mols	2
Brian Wargo	2
Bob Dorigo	2
Clint Parola	2
Karl Adams	2
Jeff Boucher	2
James Takaki	2
Kenny Llanes	2
Tim D. Cox	2
Nachtigal	2
Steve Epstein	2
BAJA CALIFORNIA, MEXICO	
Ned Falschlehner	19
David E. Brackmann	17
Dan Taylor	13
Martin Verdugo Collins	10
Kendall W. Knight Jr.	6
Mark Henwood	6
Rich Johnson	4
Jesus Araiza Jr.	4
John Algeo	4
Gerald Lester	3
Paulino Martinez	3
Anthony Hsieh	3
Felipe Gonzales	2
Ken Toy	2
Vincente Garcia	2
Richard Ruffini	2
SOUTHERN CALIFORNIA, U.S.A.	
Thomas A. Shanahan	7
Michael R. Hurt	4
Todd Mansur	4
Ron Johnson	4
Steve W. Bledsoe	3
George A. Garrett	2
Ken Brookins	2
Ned Falschlehner	2
MANZANILLO-ACAPULCO, MEX.	
Jose Luis Servin	22
Javier Vargas	15
Carlos Cale	15
Sirenio Guzman	12
Leonardo Villa Albarez	14
Jose Luis "Pepino" Servin Hernandez	9
Ed Kunze	9
COSTA RICA, CENTRAL AMERICA	
James Birschbach	12
Momi Bean	11
Randy Rozell	3
AUSTRALIA	
Peter B. Wright	5

TAG RECOVERIES IN 2001

Ten (10) billfish were reported recaptured in 2001 including five blue marlin, four striped marlin and one sailfish (Table 6). All of the blue marlin and three of the striped marlin were tagged off Kailua-Kona and Lanai, Hawaii. Three of the blue marlin were recaptured by sportfishers while the other two were captured by commercial longline fishers. Time at liberty was from 2 to 28 days and distance traveled ranged from 5 to 209 nautical miles (nmi). The striped marlin were at liberty from 14 to 68 days and ranged from 162 to 312 nmi. The sailfish was tagged and recaptured near Zihuatanejo, Mexico and recaptured 332 nmi southeast after 23 days at liberty.

Additional shark tag recaptures are included here as general interest and because they relate to the SWFSC's ongoing shark research. Four shortfin mako sharks tagged during the juvenile shark abundance survey in 2001 were recaptured after 7 to 83 days and having moved from 8 to 314 nmi. These mako had all been measured and tagged with tetracycline for age and growth studies. The return of these tags is valuable to our research and we ask your cooperation in returning the tag and a section of the shark's vertebrae should you catch one of these sharks. These specially tagged mako and thresher sharks have a white Roto tag with a 3-digit number attached to the dorsal fin indicating we need the vertebrae and tag. We offer a $25 reward when returned with a section of vertebrae. One additional sandbar shark was tagged and recaptured off Hawaii after 184 days at liberty.

Table 6. Tag recovery information for 2001.

TAGGER/ CAPTAIN	RELEASE DATE	RELEASE LOCATION	RECOVERY DATE	RECOVERY LOCATION	DAYS FREE	MILES/ DIRECTION TRAVELED
BLUE MARLIN						
Steve Morse Tim Hicks	06/28/2001	20°00'N 156°00'W Kailua-Kona, HI	07/01/2001	19°34'N 155°58'W Keauhou, Kona, HI	3	26 - SE
Ron Nakamoto Bill Casey	06/22/2001	19°38'N 155°59'W Kailua-Kona, HI	07/13/2001	21°01'N 156°03'W Maui, Hawaii	21	85 - NNW
Jimmy Akana	07/01/2001	20°31'N 156°44'W Lanai, HI	09/29/2001	19°20'N 158°30'W Southwest of Hawaii	28	128 - SW
Michael Kehoe Doug Pattengill	07/07/2001	19°32'N 156°02'W Kailua-Kona, HI	07/16/2001	16°03'N 156°12'W Southwest of Hawaii	9	209 - SSW
Rob Luckow Guy Terwilliger	09/27/2001	19°35'N 156°02'W Kailua-Kona, HI	09/29/2001	19°30'N 156°00'W Kailua-Kona, HI	2	5 - SE
STRIPED MARLIN						
Rayan Carter Rich Newcomb	02/24/2001	20°24'N 156°53'W Lanai, HI	03/10/2001	16°20'N 159°13'E South of Hawaii	14	294 - SSW
Mike Dunham Scott Fuller	02/06/2001	19°30'N 156°00'W Kailua-Kona, HI	03/03/2001	20°13'N 161°29'W West of Hawaii	25	312 - WNW
David Denholm Ned Falschlehner	11/07/2000	23°50'N 112°50'W Magdelena Bay, BCS, Mexico	12/22/2001	23°03'N 110°15'W Cabo San Lucas, BCS, Mexico	410	162 - E
Thomas Patella Scott Jones	07/18/2001	20°40'N 157°02'W Lanai, HI	09/24/2001	21°37'N 152°16'W East of Hawaii	68	292 - NNE
SAILFISH						
Richard Spielman Carlos Cole	11/16/2001	17°31'N 101°41'W Zihuatanejo, Mexico	12/09/2001	15°35'N 96°30'W SE of Zihuatanejo, Mex.	23	332 - E
MAKO SHARK						
NMFS Shark LL Research Cruise	07/01/2001	33°38'N 118°33'W Catalina Island, CA	08/07/2001	32°37'N 118°05'W San Clemente Island, CA	37	67 - S
NMFS Shark LL Research Cruise	07/07/2001	32°58'N 118°17'W San Diego, CA	07/14/2001	33°06'N 117°53'W San Diego, CA	7	25 - ENE
NMFS Shark LL Research Cruise	07/09/2001	33°19'N 118°09' W Catalina Island, CA	07/21/2001	33°12'N 118°05'W Catalina Island, CA	12	8 - SSE
Chugey Sepulveda	08/10/2001	32°54'N 117°19' W La Jolla, CA	11/01/2001	28°16'N 114°46'W Cedros Island, BC, Mex.	83	314 - SE
SANDBAR SHARK						
Don McLaughlin Jeff Rogers	10/12/2000	19°45'N 156°05'W Keahole Point, Hawaii	04/14/2001	19°45'N 156°05'W Keahole Point, Hawaii	184	No Movement

STRIPED MARLIN ARCHIVAL SATELLITE TAGGING

A satellite tagging experiment was conducted to track the seasonal migratory pattern and post-release survival of striped marlin. Fishery data indicate striped marlin migrate into southern California from the central Pacific and offshore waters of Mexico during the early summer and remain until fall. Their abundance is influenced by the seasonally warm water intrusion into the Southern California Bight and on quantities of small pelagic prey. Striped marlin occasionally move north of Point Conception, California during periods of unusually warm water.

In cooperation with the Marlin Club of San Diego, the Southwest Fisheries Science Center staff and members of the Marlin Club deployed five satellite archival pop-off tags on striped marlin during the second annual Offshore Invitational Tag and Release Tournament (September 6 and 7, 2001). Four of the satellite tags were programmed to detach from their host fish after 90 days and one was programmed to detach after 180 days. During the tournament, selected marlin were tagged with satellite transmitters (Figure 2). Four of the tagged striped marlin were judged to be in good condition at release and one was in poor condition. By October 12, 2001, the four 90-day tags had detached and transmitted archived temperature, depth and light level data to orbiting satellites. The fifth tag detached and reported on March 1, 2002 as scheduled.

Two of the satellite transmitters indicated the host fish had died shortly after deing released. The three

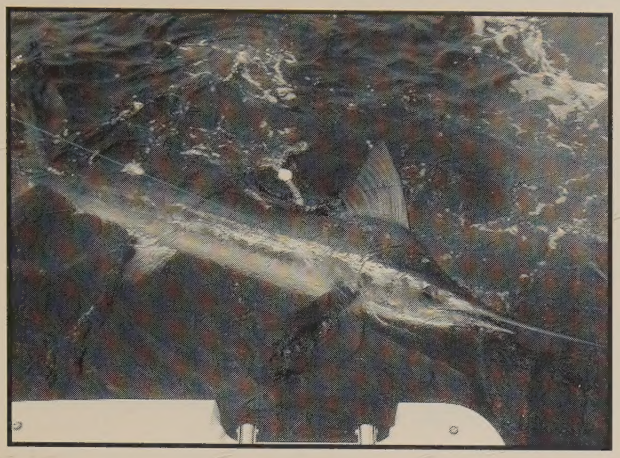


Figure 2. Striped marlin tagged with satellite pop-up transmitter 19566 and conventional tag during the San Diego Marlin Club's Offshore Invitational.

surviving marlin all moved south into Mexican waters off Baja California Sur, Mexico (Figure 3). The first tag (18955), detached prematurely from the host on October 12 for unknown reasons. The striped marlin had moved a net distance of 715 nautical miles (nmi) in 35 days averaging 20.4 nmi per day. The second marlin (19566) also moved south into Mexico's coastal waters. The tag detached inexplicably on September 23 after 16 days and a net movement of 559 nmi, averaging 34.9 nmi per day. The third marlin (28439) traveled 1,400 nmi southwest in 180 days or 7.6 nmi per day.

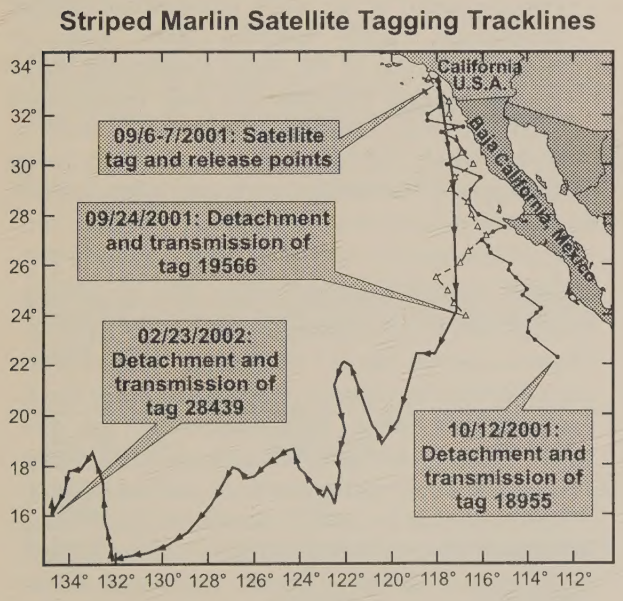


Figure 3. Track lines of three striped marlin reported from transmitted satellite tag location data. All track locations are calculated from archived light level and temperature data and judged to be accurate within 60 nmi of actual locations. Beginning and end positions are accurate to 0.05 nmi.

Ambient temperature ranges indicated marlin number 28439 remained in 18° to 20°C water during the first several days after release before moving south into progressively warmer Mexican waters (Figure 4). Marlin 18955 spent 90% of its time between 20° to 25°C while marlin 19566 experienced a wider range of temperatures with only 55% of its time spent between 20° to 25°C (Figure 5).

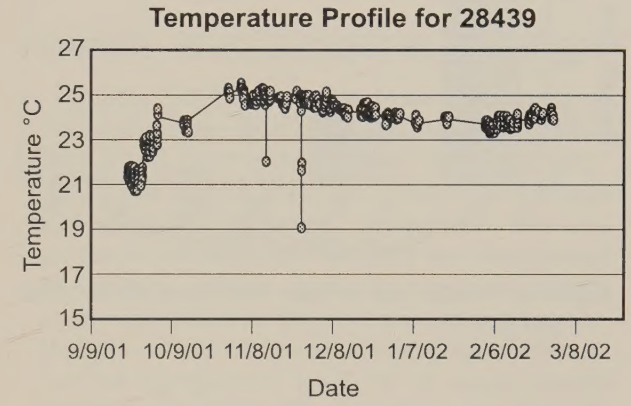


Figure 4. Temperature profile for striped marlin 28439, September 6, 2001 to March 1, 2002.

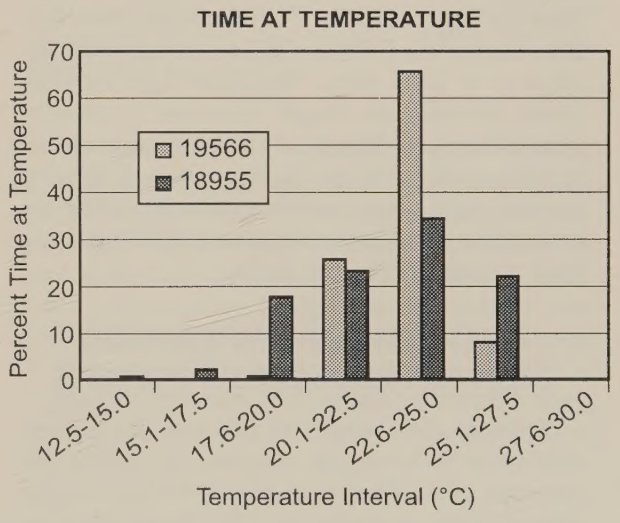


Figure 5. Percent time spent at temperature for striped marlin 19566 and 18955.

The two 90-day tags contained depth sensors to record daily swimming depths and maximum depths attained while attached to the host marlin. Marlin 18955 spent 74% of this time within 10 meters of the surface, nearly 25.2% between 10 to 50 meters and

only 1% below 50 meters (Figure 6). Its maximum depth was 110m. Marlin 19566 spent 86% of its time from the surface to 10 meters and 13.7% from 11 to 50 meters. Its maximum depth did not exceed 76 meters. Both indicated a slight tendency to spend more time below 10 meters at night.

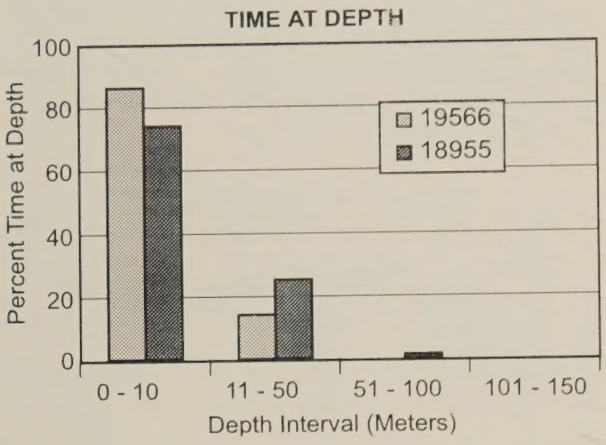


Figure 6. Percent time at depth for striped marlin 19566 and 18955.

These results support the theory that striped marlin, after moving into Southern California, return to warmer water off Mexico and the central Pacific by moving south or southeast in the offshore waters along the Baja peninsula. They prefer the warm surface water above 10 meters but will occasionally descend to at least 100m. Recorded light intensity levels, indicating day length, were used to calculate longitude and confirmed an eastward movement as the fish moved south into warmer water off Mexico. Ambient temperature and longitude data taken together allow for a fairly accurate estimate of the tracks taken by each of the three marlin.

OVERVIEW OF THE 5 MAJOR BILLFISH TAGGING PROGRAMS

A review of the combined data from the 5 major constituent based tagging programs for billfish was presented at the Third International Billfish Symposium in Cairns, Australia last year. The data from the SWFSC's Billfish Tagging Program was combined with that of the Cooperative Tagging Center in Miami, Australian Cooperative Tagging Program, New Zealand Cooperative Game Fish Tagging Program and The Billfish Foundation. That effort summarized results of the five programs on a worldwide basis. All

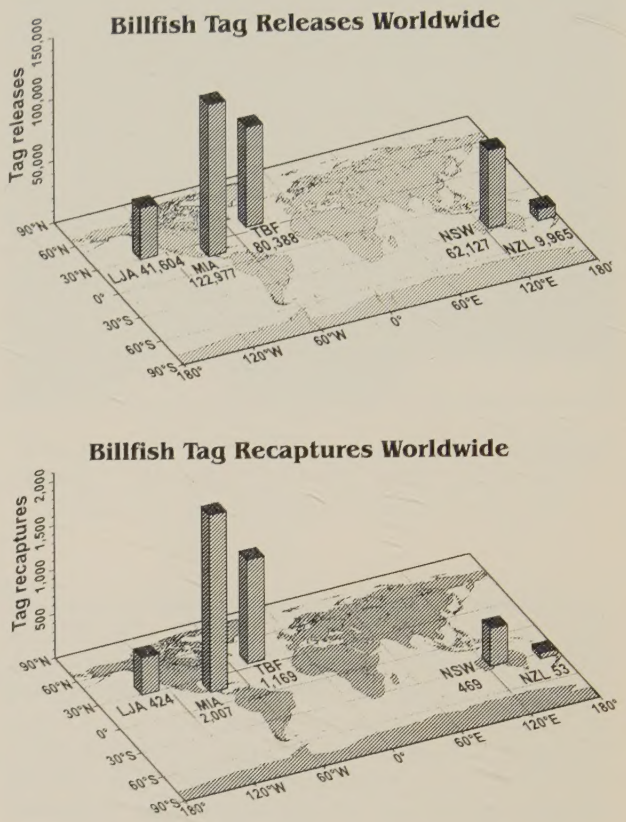


Figure 7. Worldwide billfish tag releases and recaptures. Data presented at the Third International Billfish Symposium, Cairns, Australia (2001). From "A Global Overview of the Major Constituent-Based Billfish Tagging Programs and their results since 1954". Authors: Mauricio Ortiz, Eric D. Prince, Joseph E. Serafy, David B. Holts, Kay B. Davy, Julian G. Pepperel, Michael B. Lowry and John C. Holdsworth.

together, over 317,000 billfish have been tagged and released with 4,122 recaptured since 1954 (Figure 7). Overall recapture rate is 1.30 percent. White marlin and sailfish had the highest recapture rate while black marlin had the lowest. Maximum straight line distances traveled were highest for blue and black marlin followed by striped marlin and white marlin (Table 7). A blue marlin had the longest movement (14,893 km) as it moved from the western Atlantic (US East Coast) to Mauritius in the Indian Ocean. The longest movement by a black marlin (14,556 km) was trans-Pacific and trans-equatorial as it traveled from Cairns, Australia to the eastern Pacific off Costa Rica. The longest distances moved for striped marlin and white marlin were 6,713 and 6,517 km, respectively.

Table 7. Numbers of billfish tagged, released and recaptured with maximum number of days and distance traveled in kilometers.

Species	Tagged	Recaptured	% Recaptured	Maximum Days Free	Maximum Distance (Km)
Black Marlin	41,919	286	0.68	2,044	14,556
Blue Marlin	53,514	648	1.21	4,024	14,893
Longbill Spearfish	1,181	3	0.25	1,945	1,924
Sailfish	126,716	1,923	1.52	6,568	3,861
Shortbill Spearfish	1,122	1	0.00	34	293
Striped Marlin	45,536	422	0.93	987	6,713
White Marlin	42,379	836	1.97	5,488	6,517
Total	312,367	4,119	1.32		

The longest movement for striped marlin was a trans-equatorial movement while white marlin demonstrated a trans-Atlantic movement. Sailfish exhibited the shortest maximum distance movement (3,861 km) of the major billfish.

RESULTS OF AFTCO's 2001 PACIFIC TAG/FLAG TOURNAMENT

The third annual AFTCO Pacific Tag/Flag Tournament, conducted from November 1, 2000 to October 31, 2001 included all captains and anglers who tag and release fish in each of five categories. The SWFSC provides tagging supplies to participating anglers tagging billfish and bluefin tuna. AFTCO Tournament officials combine tagging results from the SWFSC with whose of the CDFG and The Billfish Foundation to identify anglers and captains who tag and release the most fish in each of five categories.

For 2001, Pacific Captain of the Year trophy went to Captain Daniel Alverez Lucas, and Dave Denholm won Pacific Angler of the Year. Tournament tag winners in 2001 are shown below by category. Numbers in parentheses indicate numbers of fish tagged and released.

CATEGORY	ANGLER	CAPTAIN
1. Blue/Black Marlin	Paul Bender (16)	Gene VanderHoek (52)
2. Striped Marlin	Dave Denholm (99)	Ned Falschlehner (109)
3. Sailfish	Thomas Hammond (33)	Ron Hamlin (394)
4. Thresher/ Mako Shark	Keith Poe (66)	Deana Poe (66)
5. Bluefin Tuna	none	

FISHERY MANAGEMENT PLAN UPDATE

In 2001, SWFSC biologists spent considerable effort preparing the West Coast Fisheries Management Plan (FMP) for highly migratory species (HMS). West Coast fisheries have open access to most pelagic tuna, swordfish and sharks. Management measures are needed to ensure that domestic and international conservation of these species is consistent, precautionary and based on the most accurate information available. The FMP provides background information and management options for 13 pelagic species including swordfish, striped marlin, yellowfin tuna, bluefin tuna, bigeye tuna, skipjack, albacore,thresher shark (3 species), mako shark, blue shark and dorado. The goal is to implement long-term conservation, prevent overfishing, provide diverse recreational and commercial fishing opportunities, and to minimize bycatch and user conflicts.

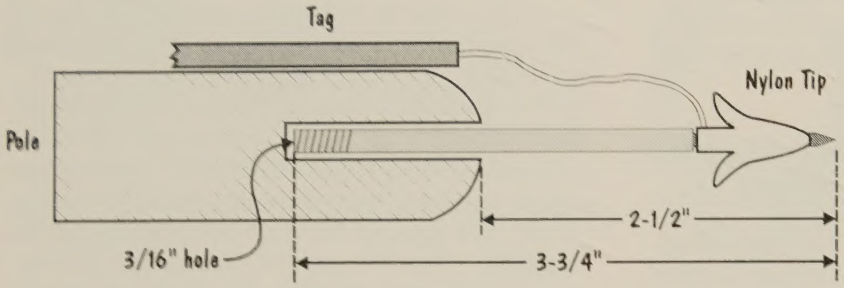
The final draft FMP contains a number of initial conservation and management alternatives including controls on commercial drift gillnet and longline fishing. The Pacific Fishery Management Council approved the FMP for public review in February 2002. Final comments are being addressed and the final FMP could be finalized by November 2002. Once the FMP is enacted, Council may decide on any number of regulatory options to manage pelagic fisheries along the West Coast. For additional information call or write the:

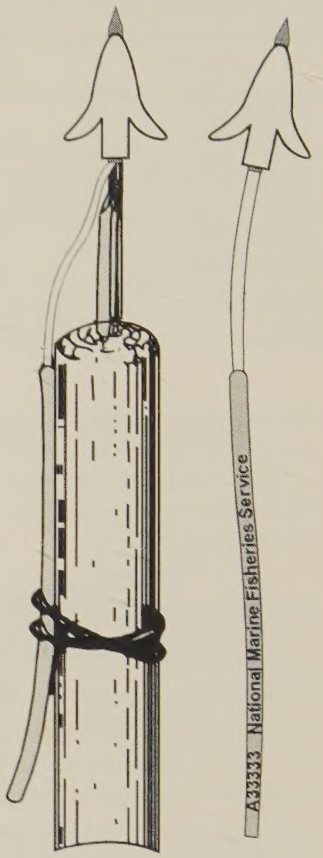
Pacific Fishery Management Council
2130 SW Fifth Avenue, Suite 224
Portland OR 97201
(Phone 503/326-6352).
The draft FMP is available online at http://www.pcouncil.org.

SUCCESSFUL CATCH, TAG AND RELEASE

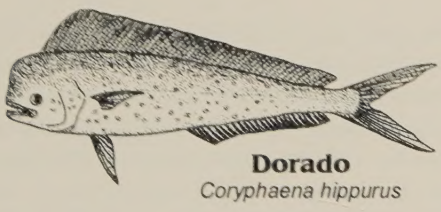
It is important that the billfish tag be applied properly. Tag location, angle, and depth are critical to successful tagging. The tag should be inserted 2.5 inches just below the tallest part of the dorsal fin. Manufactured tagging poles are available at most retail sportfishing stores. It is important to check the length of the applicator pin installed on these poles to ensure the tip extends only 2.5 inches. Some manufacturers have changed the overall length of the pins in which case the stopper must be adjusted to only allow the 2.5-inch penetration.

An old broom or mop handle works very well, if you construct your own tagging pole. Made of hardwood and about 5 feet long they make a sturdy and reliable tagging pole. A pole should be drilled with a 3/16 inch or No. 16 drill bit to a depth of 1.25 inches for the applicator tip (see diagram below). Insure the applicator protrudes exactly 2.5 inches. Use a good grade epoxy to secure the applicator pin and seal out saltwater.

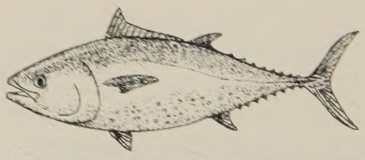




Survival of tagged and released billfish depends on several decisions you, the angler, must make prior to and during fishing. Following is a guide that will enhance post-release survival of your billfish.

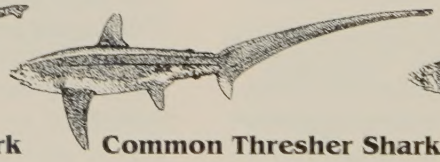


Dorado
Coryphaena hippurus

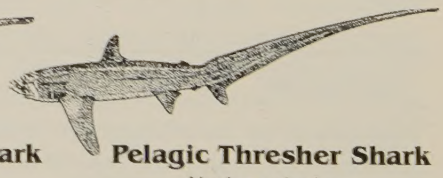


Northern Bluefin Tuna
Thunnus orientalis

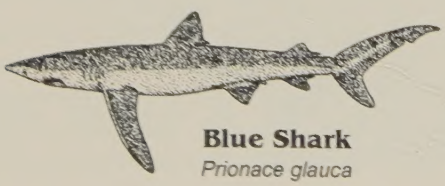
Bigeye Thresher Shark
Alopias superciliosus



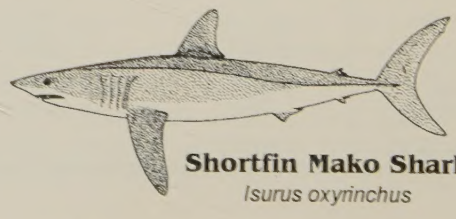
Common Thresher Shark
Alopias vulpinus



Pelagic Thresher Shark
Alopias pelagicus



Blue Shark
Prionace glauca



Shortfin Mako Shark
Isurus oxyrinchus

1. BEFORE YOU CATCH YOUR FISH:

First decide if this is a fish you want to tag and release. If so, rig your terminal tackle with a single, circle hook for bait fishing or a single circle or single J hook if trolling. Do not use double rigged J hooks when releasing your catch.

2. WHILE FISHING:

Bring your fish to leader as quickly as possible but wait until the fish is calm and swimming beside the boat before tagging. Never attempt to tag a fish while it is jumping or thrashing about.

3. TAGGING:

Tag the fish as it is being towed alongside the boat by inserting the tag in the back muscle below the tallest part of the dorsal fin. Avoid the gills, head and stomach. Take care not to allow your fish to injure itself on the vessel's transom or boat hull.

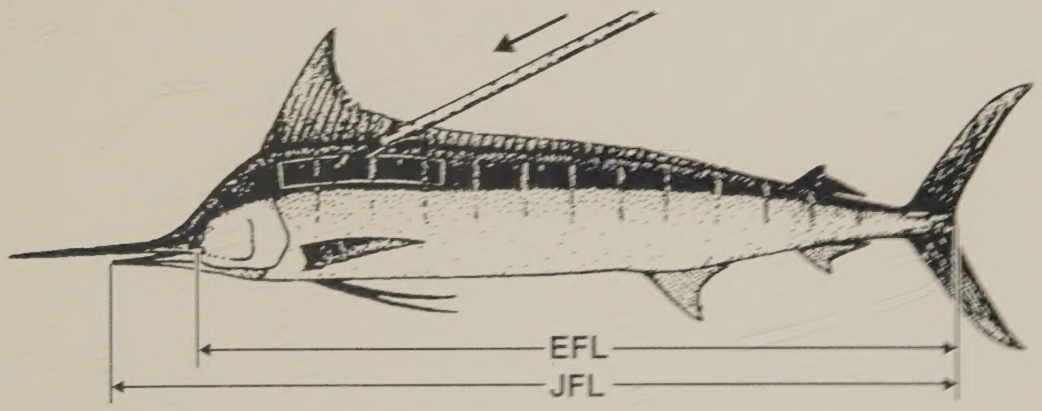
4. RELEASING:

Remove the hook with a good pair of pliers or if deeply hooked in the throat or stomach, release it by cutting the leader as close to the hook as possible. If the fish appears lethargic, but otherwise uninjured, revive it by slowly towing it through the water, allowing water to flow over the gills until it begins to swim on its own.

5. COMPLETE THE BILLFISH TAGGING REPORT CARD:

Fill out the yellow Billfish Tagging Report card completely and as accurately as possible indicating latitude and longitude, date of release, estimated length (lower jaw-to-fork length; JFL) and weight of the fish. Include name and mailing address of the angler and boat captain and other remarks as appropriate. Return cards promptly to the Southwest Fisheries Science Center.

PLEASE NOTE: Billfish recaptures without tag release information now number 93 or 13 percent. This equates to nearly 6,400 billfish that have been tagged without the release information being returned to the SWFSC. Make your tagging effort count. Tag and release your fish skillfully and return the yellow BILLFISH TAGGING REPORT. Though easily forgotten in the heat of battle and glow of success, returning the card is the most critical and final step in tagging your fish.



PAPER REDUCTION ACT NOTIFICATION

The NMFS needs this information for the conservation and management of fishery resources. The information will be used for billfish research. Public reporting burden for the Billfish Angler Survey card is estimated to average 5 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. The reporting burden to complete the Billfish Tagging Report is estimated to average five minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate to the SWFSC, 8604 La Jolla Shores Drive, La Jolla, CA 92037. The information submitted will be a public record. Notwithstanding any other provision of the law, no person is required to, nor shall any person be subject to a penalty for failure to comply with, a collection of information subject to the requirements of the Paperwork Reduction Act, unless that collection of information displays a currently valid OMB Control Number.

SEND US YOUR PHOTOGRAPHS

The Southwest Fisheries Science Center is looking for good photographs of billfish for the cover of next year's *Billfish Newsletter*. Color or black-and-white photos of billfish and/or fishing activities are appropriate. We would appreciate your sharing of photos and will give you full credit in the 2003 issue. A billfish baseball cap and plaque will be awarded to the winning photographer. This year's winning cover photograph is of a striped marlin caught and released during the Marlin Club's Offshore International Tournament. Photo taken by Rick Gaffney aboard the sportfisher Obrao. Rick is a well-known author and photographer living in Hawaii.

ACKNOWLEDGEMENTS

The information reported here would not be possible without the cooperation of thousands of anglers and volunteers who support these investigations. Their efforts and assistance are greatly appreciated. We welcome reader comments and suggestions concerning the content of the Billfish Newsletter.

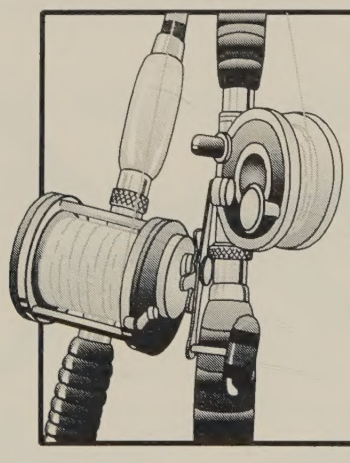
Roy Allen designed and produced the newsletter.

WEB SITE

The *Billfish Newsletter* can also be accessed on the Southwest Fisheries Science Center's home page at http://swfsc.ucsd.edu/frd

SURVEY RESPONSE

BILLFISH ANGLER SURVEY cards for fishing in the 2002 calendar year will be mailed out in December of this year. Please complete the survey and return the post-paid survey form by February 2003. Additional 2002 *Survey* cards will be available to all billfish anglers from this office. U.S. Government regulations require we purge our mailing list each year. If you wish to continue to receive the Billfish Newsletter but did not fish, please indicate "NO FISHING" on the Billfish Angler Survey form and return it to the Center. Your name will be retained. Your continued response to the Billfish Angler Survey is needed to index changes in abundance of billfish stocks important to recreational fisheries.



Smooth seas and good fishing,

David B. Holts, Fishery Biologist
Randall Rasmussen, Camputer Specialist

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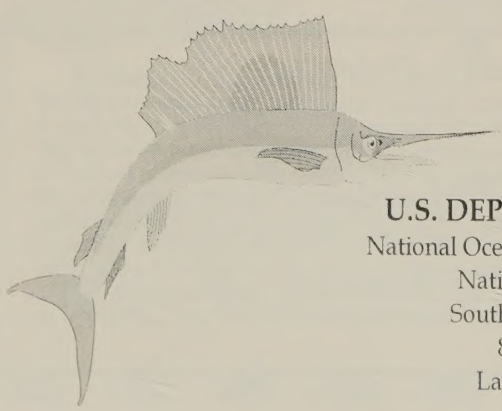
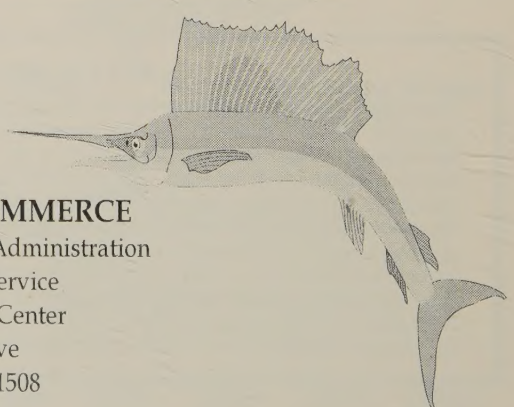
rand.rasmussen@noaa.gov





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National Marine Fisheries Service
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La Jolla, California 92037-1508